

World-Class Visualizations in GMAT, Phase II

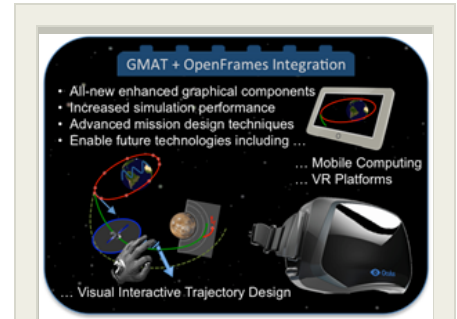
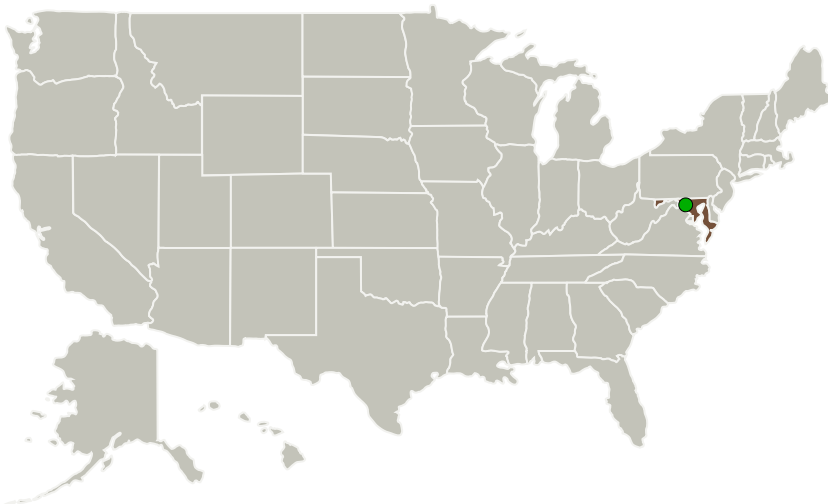
Completed Technology Project (2016 - 2019)



Project Introduction

Today's mission designers rely on state of the art tools with modern graphical user interface (GUI) elements and real-time 3D interactive graphics to visualize their trajectories and orbit control strategies. NASA GSFC's General Mission Analysis Tool (GMAT) offers advanced mission design and optimization capabilities with a flexible GUI, but its 3D graphics are lacking in both the quantity and quality of its graphical components as well as the maturity of its visualization subsystem. Emergent will therefore modernize GMAT with world-class visualization capabilities via a graphics architecture that can adapt to future visualization technologies by replacing the existing basic graphics code with the OpenFrames visualization software. OpenFrames is an Open Source API that allows simulations to incorporate high-performance interactive 3D visualizations without requiring significant changes to the existing software architecture. We will utilize the mission design visualization requirements developed in Phase I to fully integrate OpenFrames into GMAT and demonstrate how it enables new and innovative mission design applications such as visual interactive trajectory design and Virtual Reality-based simulation and modeling. As a result, this research will not only bring GMAT visualizations up to par with COTS mission design tools such as STK/Astrogator, but will also enable it to be viable for use in virtual reality environments such as the Oculus Rift. Modernized visualization technology will increase GMAT's user base and enhance its utility for future NASA Discovery and Human Space Flight missions that require high-fidelity simulations paired with truly interactive 3D visualizations.

Primary U.S. Work Locations and Key Partners



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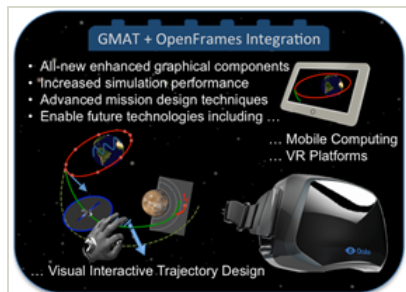


Organizations Performing Work	Role	Type	Location
Emergent Space Technologies, Inc.	Lead Organization	Industry	Greenbelt, Maryland
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/127212>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Emergent Space Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Ravi Mathur

Co-Investigator:

Ravishankar Mathur

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Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.1 Optical Communications
 - └ TX05.1.4 Pointing, Acquisition and Tracking (PAT)

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System